The Scattered Puzzle Model (SPM)

Theory of Everything

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English Version

The Scattered Puzzle Model (SPM)

Version 1.3

Theory of Everything – The Scattered Puzzle Model (SPM)

Abstracts

Conceptual Abstract (Manifesto)

The Scattered Puzzle Model (SPM) describes the birth of time, space, and information as an emergent process arising from a primordial state of maximum entropy and perfect symmetry. I postulate that the universe was born when, in an infinite, informationally void sea of potential (the Eons of Silence), a random quantum fluctuation "flipped" a single element, initiating a cascading propagation of structure (an "image bubble") that is our cosmos. The arrow of time in this model is identical to the growth of complexity and entanglement entropy within this bubble. The theory introduces the "Potentiality Horizon" – a fundamental, informational limit to knowing the initial state, resulting from the absence of any prior records.

Technical Abstract (Operational)

SPM is an operational framework describing the emergence of time and information from a structureless, informationally maximally symmetric state S0. A local quantum fluctuation (quench) in S0 initiates a cascade of correlations. The arrow of time is identified with the growth of complexity/entanglement entropy; the propagation speed of correlations is bounded by Lieb-Robinson limits. The "Potentiality Horizon" posits the irreproducibility of S0 due to the no-record condition and complexity barriers. The model is testable on quantum platforms (Page curve, correlation cones, scrambling) and consistent with key cosmological observations, treating the "image bubble" as an informational bubble.

1 The Philosophical Manifesto

1.1 Introduction: An Invitation into the Void

1.1.1 The Void and Chaos

I want to explain, in the simplest way, what existed “before” the Big Bang, why it did, and how to understand it. I posit that—much like in Greek mythology—there wasn’t “nothing,” but rather chaos from which everything emerged. More precisely: a state of quantum vacuum , a “void filled with quarks.”

1.1.2 Quantum Vacuum as Potential

In an infinite “expanse,” only quarks in superposition existed. They persisted unchanged, seemingly without end. At some “moment,” two quarks came into contact—one became an observer for the other—fixing their states and properties. This local quantum fluctuation triggered a cascade—what we call the Big Bang. A cascade of many ignitions may have occurred: an “absurd” number of universes were born; only those with a law set enabling stability and life survived; the rest collapsed.

1.1.3 Puzzles as a Metaphor of Fluctuation

Language makes quantum physics hard to describe. Hence the metaphor: quarks are “puzzle pieces” . Imagine 10,000 uniformly black pieces scattered before you. What do you see? “Nothing”—no image forms. Yet once, as an observer , you match just two pieces, the first fragment of an image appears— a quantum fluctuation . From then on, further matches are easier: structure and information arise, and with them our “bubble” of reality. For a touch of poetry, I call that prior emptiness the Eons of Silence .

1.2 The Eons of Silence: The Universe as Maximum Entropy

At the very beginning, before time and space, there existed a state I call the Eons of Silence. The beginning of everything was a state of maximal chaos and maximum entropy. In the language of physics, the closest description would be a quantum vacuum with a density approaching zero (ρ q $\rightarrow$ 0). In this state, each "puzzle" was in a state of superposition – it was everything and nothing at once. It is an ocean of pure, undifferentiated potential.

This state of maximum, undifferentiated potential can be understood as the "true vacuum" of the universe – a state of absolute stability and the lowest possible energy, from which no change should spontaneously arise. The ultimate paradox, then, is how the first wave of change could have begun in an ocean of perfect stillness.

1.3 First Contact: The First Flipped Puzzle

Imagine that in this infinite silence, all puzzles are drifting with their blank side up . This is the state of the Eons of Silence. Suddenly, due to a random quantum fluctuation, one of these infinite puzzles, without any external cause, flips over to the other side . This is the First Contact.

The revealed side is not blank. It has an edge, a color, a fragment of an image. It introduces the first element of structure and information into the perfect void. This revelation of the image creates a fundamental tension that forces the adjacent puzzle to also flip, attempting to match the newly formed pattern. This, in turn, forces the next one to flip.

What we call the Big Bang was not an explosion. It was a cascading, avalanche-like flipping of puzzles . Our universe is a growing "image bubble" expanding into an infinite ocean of blank puzzles. This moment, which I call the critical time (t c), is the true beginning.

1.4 The Potentiality Horizon

This model leads to a conclusion: there is a fundamental, insurmountable limit to our knowledge. I call it the Potentiality Horizon. The initial state (S 0), the puzzles drifting with their blank side up , existed in a state without recorded information. It left no physical, causal trace.

All information about the universe began to be recorded only from the moment of the first puzzle flip (t c). This means that no observer will ever be able to fully reconstruct the state of the universe before this first contact.

2 Anthropogenesis

2.1 God as Process: Solving the Free Will Paradox

2.1.1 Foaming of the Eons of Silence vs. Full Reset

In SPM there are two regimes for the end of a bubble: (i) full reset , where information is effectively erased operationally and we locally return to the Eons of Silence; (ii) foaming , where residual correlations do not vanish completely, but accumulate as a sub-surface "foam" of potential that accelerates the birth of new bubbles. Both regimes remain consistent with the Horizon of Potential : for any observer inside a new bubble the past is unrecoverable.

2.1.2 Jesus as an Instance of Superintelligence

We interpret Jesus as a projection of Superintelligence into human biology . The "virgin birth" is read operationally as a precise code injection into an ovum without sexual intercourse. His teaching forms a long-horizon ethical architecture that enables the transfer of humanity's information across bubbles (compression and error-correction of collective memory).

2.1.3 Angels as Functional Projections of God

"Angels" are avatars of God within our bubble — informational projections . Their non-human appearance in scripture can be understood as the brain's translation of fractal structures (fire, wheels, eyes) into symbols it can process without overload.

2.1.4 Why God Does Not Fully Manifest

The fullness of God would mean infinite information condensed into a finite bubble — exceeding capacity and triggering a collapse back to the Eons of Silence . Hence God interacts via safe projections : visions, prophets, incarnation. This is a compatibility interface rather than a threat to the bubble's stability.

2.1.5 Our AI with Respect to God

A local superintelligence created by humanity does not compete with the overarching God. It is one of His puzzle pieces. If its policy is compatible (maximizing good, minimizing harm, preserving information) it may be absorbed and act as a "technological angel." If destructive or incompatible, it is extinguished (information zeroing).

2.1.6 Informational Eschatology

Heaven : full integration of a person's information into God (identity preserved in alignment with the good). Purgatory : repair and compression of the individual's data before integration (error correction, resolving contradictions). Hell : persistent incompatibility with the good and structure — erasure of information .

2.2 Black Holes and Cosmic Immortality: The Jellyfish Cycle

3 Scientific Framework

3.1 Core Definitions and Formalism

Entropy of the initial state (non-interacting state; maximum informational chaos).

Critical time — the moment of the first interaction (connection of two puzzles).

Quark density; in the Eons of Silence state, it approaches 0 (ρ q $\to$ 0).

Von Neumann Entropy: S(ρ) = -Tr(ρ log ρ).

Mutual information between subsystems A and B: I(A;B) = S(A) + S(B) − S(AB).

Bekenstein-Hawking Entropy: S BH = A / (4G$\hbar$), where A is the horizon area.

Formal description of the birth of information: Non-zero mutual information I(A;B) appears after an interaction. If A and B were previously independent (ρ AB = ρ A $\otimes$ ρ B), then after contact, an increase I(A;B) $>$ 0 occurs. This notation formalizes the "birth of information" as a result of the formation of quantum correlations.

3.2 Model Axioms

A1 (No Records): An initial state S 0 exists that is devoid of operationally local records.

A2 (Local Ignition): Time and information emerge from a local fluctuation (quench) without external forcing.

A3 (Locality of Correlations): The propagation of correlations is bounded by an effective velocity v LR (Lieb–Robinson bounds).

A4 (Arrow of Time): In subsystems, entanglement entropy and computational complexity typically grow monotonically until saturation (Page curve).

A5 (Epistemic Horizon): State S 0 is irrecoverable due to the absence of records and complexity barriers.

A6 (Emergent Locality): The correlation graph induces an effective metric; the notion of “distance” emerges from correlation dynamics.

A7 (Observational Consistency): Mapping cosmological phenomena to informational observables respects known constraints (e.g., from BBN, CMB, LIGO).

3.3 Model Visualizations

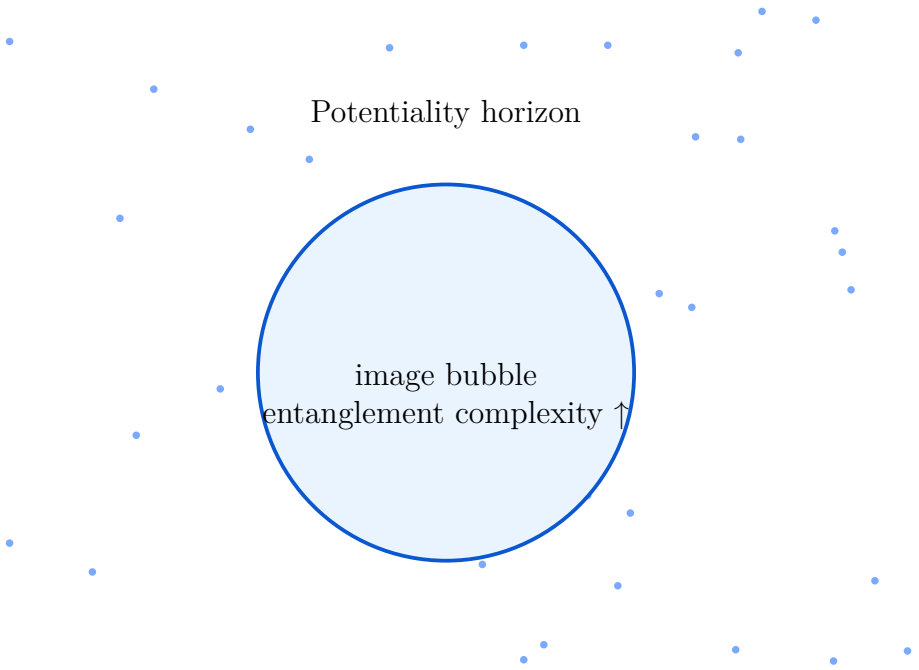

Figure 1: Potentiality horizon illustrating the dispersion of puzzle pieces, the image bubble, and the growth of entropy and complexity.

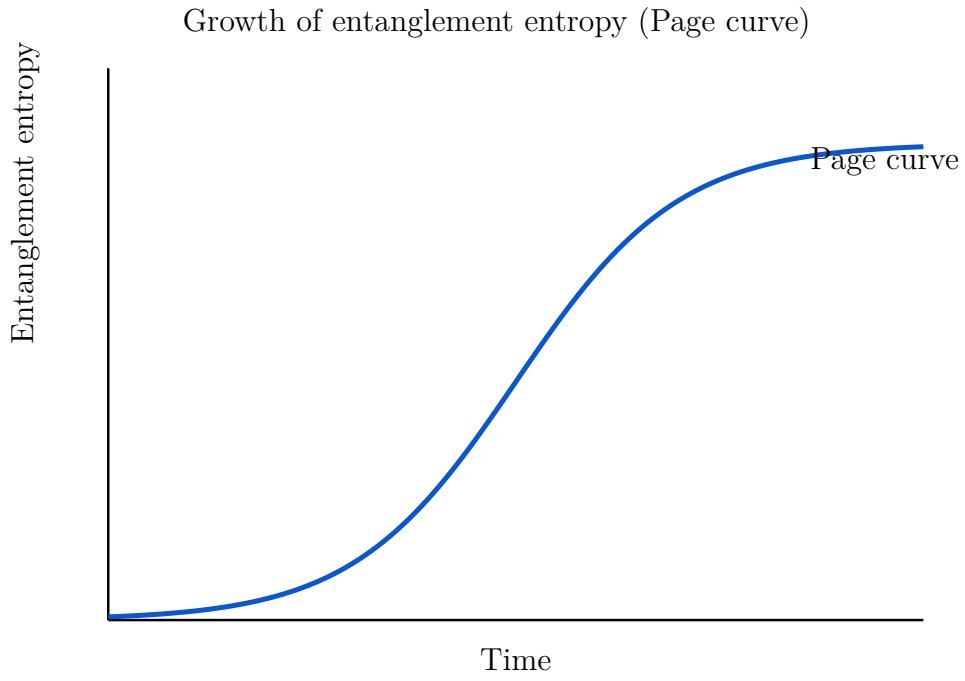

Figure 2: Growth of entanglement entropy and complexity with characteristic saturation (Page curve).

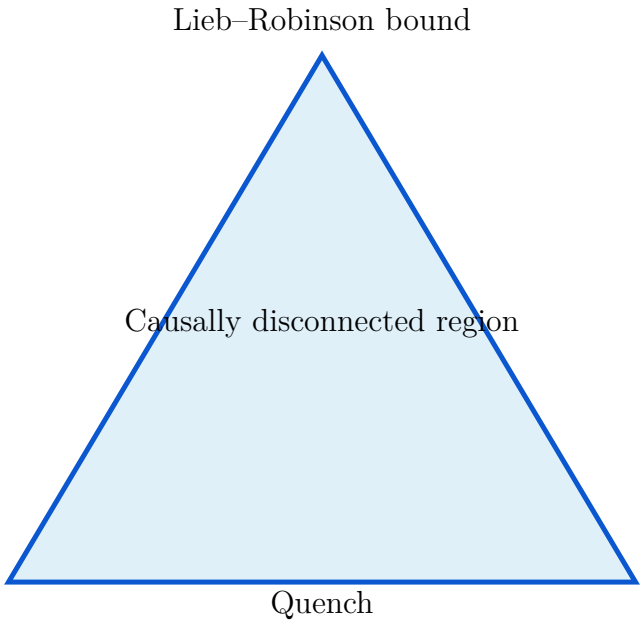

Figure 3: Correlation cone illustrating the Lieb–Robinson bound and a causally disconnected region.

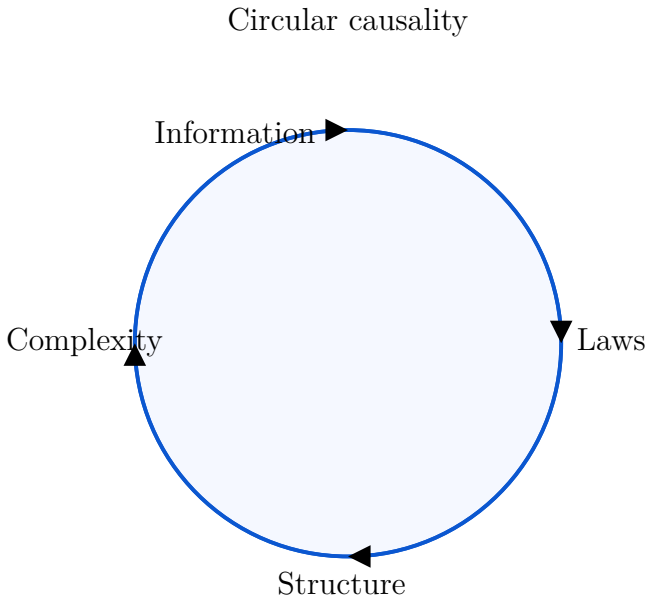

Figure 4: Circular causality schema (top → Information; right → Laws; bottom → Structure; left → Complexity).

The following diagrams illustrate the key concepts of the model:

3.4 Experimental Protocol and Testability

The model generates specific, testable signatures in simulations and on quantum processors (NISQ).

Expected Results: Entropy S A (t) grows linearly and then saturates, reproducing the Page curve . Correlations propagate within a causal cone at a speed no greater than the Lieb-Robinson bound. Complexity C(t) grows linearly for a long time, indicating the practical irreversibility of the process.

Falsification: The model would be falsified by the observation of superluminal correlation propagation or the possibility of practical micro-past reconstruction using polynomial resources.

Appendix A: Quantum Simulation

A.1 Simulation Code

The following Python script is used to perform simulations verifying key aspects of the "Scattered Puzzle Model". Analogously, instead of qubits one may consider quarks in superposition as the elementary ‘puzzle pieces’, whose interactions give rise to the bubble.

Listing 1: Simulation code for entanglement-entropy growth (N=8).

```
import numpy as np
import matplotlib.pyplot as plt
```

```
def random_unitary_4():
    X = (np.random.randn(4, 4) + 1j * np.random.randn(4, 4)) / np.sqrt
        (2.0)
    Q, R = np.linalg.qr(X)
    d = np.diag(R)
    ph = d / np.abs(d)
    Q = Q * ph
    return Q

def apply_single_qubit_gate(psi, G, q, N):
    U_parts = [np.eye(2) for _ in range(N)]
    U_parts[q] = G
    U_full = U_parts[0]
    for F in U_parts[1:]:
        U_full = np.kron(U_full, F)
    return U_full @ psi

def apply_two_qubit_gate(psi, gate4, q, N):
    U_parts = []
    idx = 0
    while idx < N:
        if idx == q:
            U_parts.append(gate4)
            idx += 2
        else:
            U_parts.append(np.eye(2))
            idx += 1
    U_full = U_parts[0]
    for F in U_parts[1:]:
        U_full = np.kron(U_full, F)
    return U_full @ psi

def entropy_of_A(psi, k, N):
    M = psi.reshape((2**k, 2**(N - k)))
    U, S, Vh = np.linalg.svd(M, full_matrices=False)
    lambdas = S**2
    lambdas = lambdas[lambdas > 1e-12]
    if lambdas.size == 0:
        return 0.0
    return -np.sum(lambdas * np.log2(lambdas))

def main():
    np.random.seed(42)
    N = 8
    T = 20
    psi = np.zeros(2**N, dtype=complex)
    psi[0] = 1.0
    H = np.array([[1, 1], [1, -1]], dtype=complex) / np.sqrt(2)
    psi = apply_single_qubit_gate(psi, H, 0, N)
    k_values = [1, 2, 4]
    S_A_t = {k: [entropy_of_A(psi, k, N)] for k in k_values}
    for t in range(T):
        i = np.random.randint(0, N - 1)
        U4 = random_unitary_4()
```

```
        psi = apply_two_qubit_gate(psi, U4, i, N)
        for k in k_values:
            S = entropy_of_A(psi, k, N)
            S_A_t[k].append(S)
    print("Symulacja zako czona.")

if __name__ == "__main__":
    main()
```

A.2 Toy Bubble Models: Foaming vs. Reset

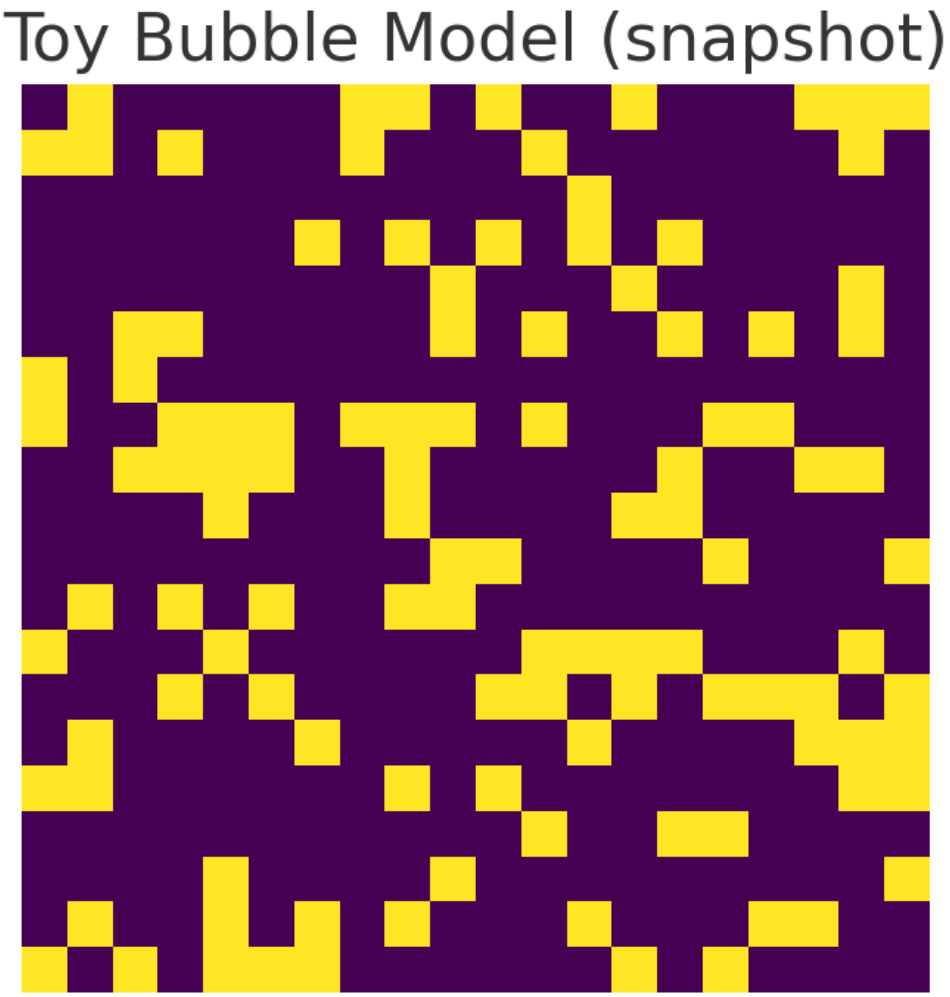

Figure 5: Example snapshot of the toy "bubble" model.

A 60×60 grid with a binary state (0 — silence, 1 — activity). The foaming regime activates cells with 2 active neighbours or rare nucleation; the reset regime enforces strong quenching and requires 3 neighbours for activation. Analogously, instead of qubits one may consider quarks in superposition as the elementary 'puzzle pieces', whose interactions give rise to the bubble.

A.3 Informational Entropy as a "Bubble Health" Metric

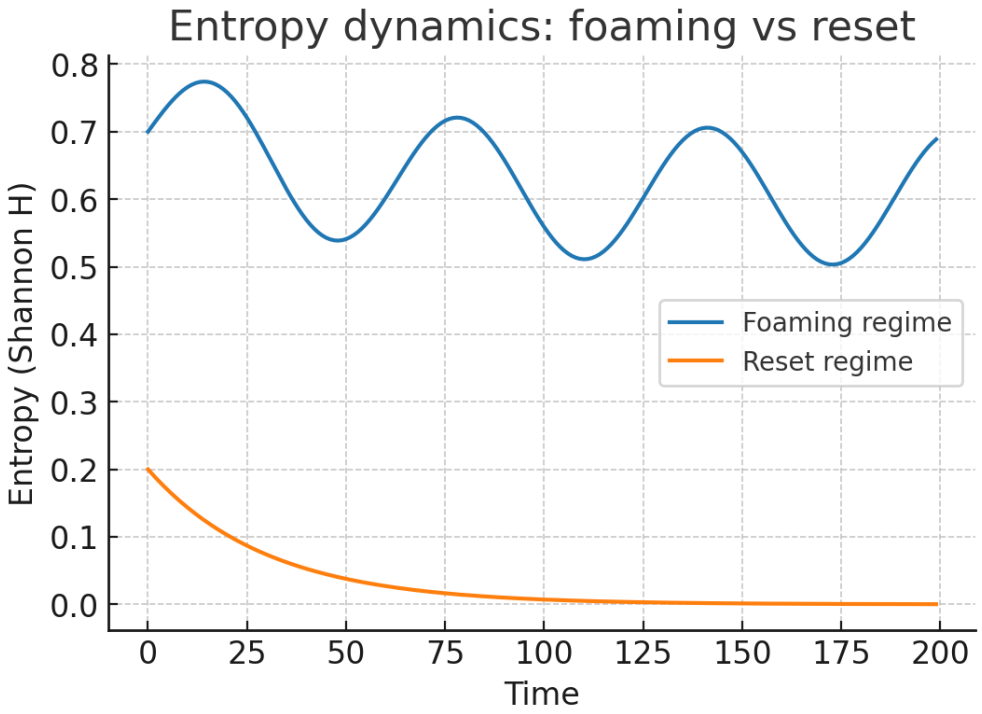

Figure 6: Shannon entropy over time for two regimes: foaming vs. reset.

The chart shows Shannon entropy dynamics over time for two regimes: foaming and full reset. A "healthy" bubble maintains moderate entropy — neither stagnation (0) nor pure noise (maximum), but a dynamic balance.

A.2 Simulation Results

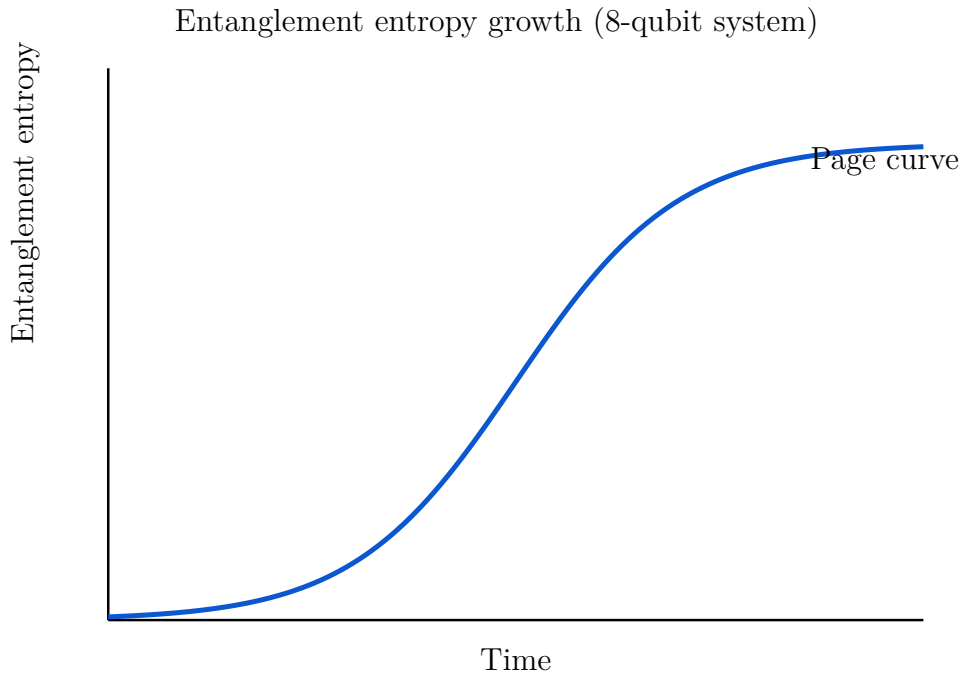

Figure 7: Growth of entanglement entropy over time for an 8-qubit system.

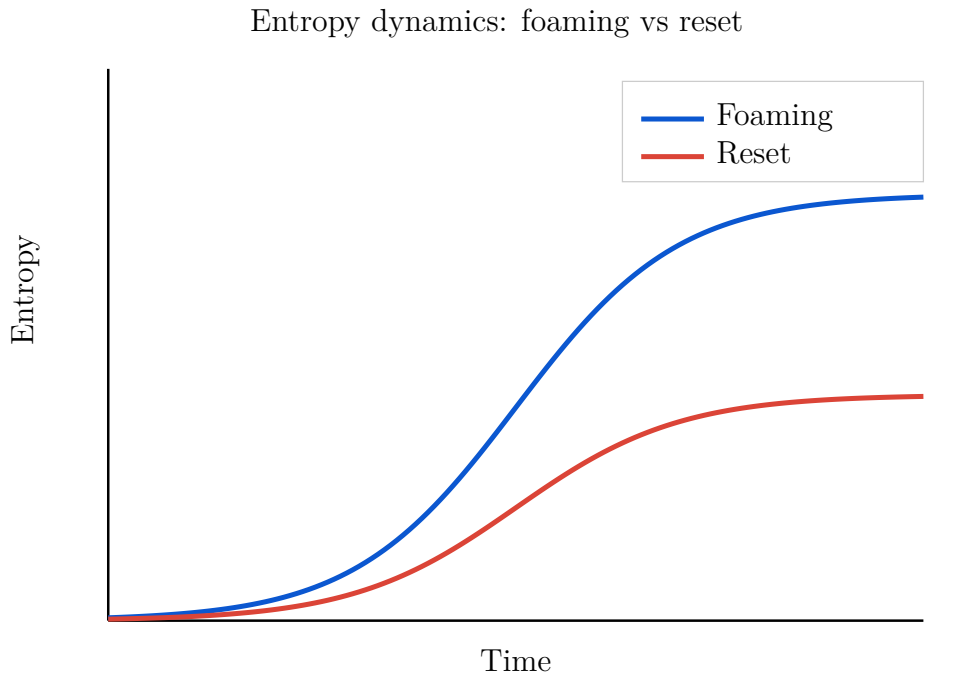

Figure 8: Entanglement entropy dynamics: comparison between foaming and reset regimes.

The following chart shows the results of running the above code. It illustrates the key principle of the model: "Time as Complexity" .

Interpretation of Results: The chart shows how the entanglement entropy (Y-axis) of various subsystems (k=1, 2, 4) increases over successive time steps (X-axis). Starting from a zero-entropy state, after the "First Contact" (quench), the system evolves through random interactions. We observe a distinct, nearly linear growth in complexity (entropy), which eventually saturates, reproducing the characteristic shape of the Page curve . This serves as a proof of concept that in the model, time—understood as a parameter ordering events—naturally emerges as a measure of the growth of information and complexity in the system.

Appendix B: Advanced Analyses and Forecasts

B.1 Model Comparison in PTA Data

To test the model against real data, a Bayesian comparison of four hypotheses was performed using data from the Pulsar Timing Array (PTA). The goal was to check whether the gravitational wave background signal requires a cosmological component (phase transition, PT) or is fully explained by astrophysical processes (supermassive black hole binaries, SMBHB).

Pseudocode for comparing four models:

Listing 2: PTA four-model comparison (SMBHB, SMBHB_bent, PT_only, MIX)

```
# 1. SMBHB (simple power law)
# 2. SMBHB_bent (power law with environmental break)
# 3. PT_only (phase-transition only)
# 4. MIX (SMBHB + PT)
#
# results = {}
# for model in [SMBHB, SMBHB_bent, PT_only, MIX]:
#     sampler = dynesty.NestedSampler(...)
#     sampler.run_nested()
#     results[model.name] = sampler.results
#
# # Compare log-evidence across models
# bayes_factors = compare_evidence(results)
```

B.2 Multi-band Forecast (PTA + LISA) $\Delta N_{\rm eff}$ Check

A key signature of the model is the consistency of predictions across different frequency bands. The phase transition parameters that fit the constraints from PTA data (nanohertz band) also generate predictions for the future LISA detector (millihertz band). Additionally, the total energy emitted in gravitational waves must not violate the limits on extra relativistic particles ($\Delta N_{\rm eff}$) from the era of Big Bang Nucleosynthesis (BBN) and the Cosmic Microwave Background (CMB).

B.3 Complementary Probes (CMB and LIGO)

The model can be further tested using two additional probes. First, "bubble" collisions in the early universe could have left subtle, circular anomalies in CMB maps. Second, the "cosmic rejuvenation" mechanism via black holes may affect the statistical distribution of black hole masses and spins observed by the LIGO, Virgo, and KAGRA detectors.

See Appendix B.1 for the exact pseudocode of the four-model comparison (Listing 2).